

TAIL LENGTH IN ENIGMATIC NORTHEAST INDIAN MACAQUES AND PROBABLE RELATIVES

(With four text-figures)

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Key words: Arunachal Pradesh, *Macaca assamensis*, *Macaca thibetana*, range extension, subspecific contact zone, tail length variation

Recent sightings in western Arunachal Pradesh, Northeast India, of macaques with tail proportions similar to those in *Macaca assamensis assamensis* apparently extend the known range of this subspecies c. 400 km westward along the Lesser Himalaya, across the great bend of the Brahmaputra river. The contact zone between *M.a. assamensis* and *M.a. pelops* apparently is at c. 2,000 m along the slopes of the Lesser Himalaya west of the Brahmaputra river, in Arunachal Pradesh and possibly also in adjacent Bhutan.

INTRODUCTION

Macaca assamensis and *M. thibetana* are closely related species that inhabit contiguous areas in southern and eastern Asia (Fig. 1; Fooden 1988, p. 19); despite their close relationship, these two species differ strikingly in tail length. Recently, Choudhury (1998, p. 7; 2000, p. 14) conducted field work in a previously unsurveyed area in Northeast India and observed monkeys that obviously belonged to the *M. assamensis* - *M. thibetana* group, but in which tail length differed from what previously would have been expected in that area. The purpose of the present paper is to consider Choudhury's new information in the general context of tail length variation in *M. assamensis* and *M. thibetana* (see Appendix).

GEOGRAPHIC DISTRIBUTION AND TAIL LENGTH VARIATION IN *M. ASSAMENSIS* AND *M. THIBETANA*

Macaca assamensis includes two recognised subspecies, *M.a. pelops* and *M.a. assamensis*, which differ in tail length (Fig. 1). The known geographic distribution of *M.a. pelops* is narrowly restricted to the Outer and Lesser Himalaya from central Nepal (83° 36' E) eastward

to northeastern Assam (94° 25' E) (Fooden 1982, p. 4; Choudhury 1997, p. 37). The known geographic distribution of *M.a. assamensis* is much more extensive, encompassing lower and middle mountain ranges in continental Southeast Asia, from c. 30° N in Xizang (earlier Tibet), China, to c. 15° N in Thailand and Laos (Fooden 1982, p. 5). Prior to Choudhury's (1998, p. 7; 2000, p. 14) recent research, the gap between the easternmost Himalayan record of *M.a. pelops* (94° 25' E) and the westernmost known Himalayan record of *M.a. assamensis* (95° 45' E) was c. 175 km wide. *Macaca thibetana*, in which no subspecies are recognised, is broadly distributed in eastern China, from c. 25° to 33° N and from c. 102° to 120° E (Fooden 1988, p. 2).

The following summary of tail length variation in *M.a. pelops*, *M.a. assamensis*, and *M. thibetana* focuses on the ratio of tail length to hind foot length (T/HF) in adult males, which is the only relevant information available concerning the newly observed monkeys in Northeast India; however, tail length variation in adult females and immatures in *M. assamensis* and *M. thibetana* is generally similar to that in adult males (Fooden 1988, pp. 9, 10). T/HF in adult males clearly declines progressively in *M.a. pelops*, *M.a. assamensis*, and *M. thibetana* (Fig. 2). In *M.a. pelops* adult males, T/HF values (mean ± SD, extremes) are 1.86 ± 0.109, 1.73-2.07, n = 8; in *M.a. assamensis* adult males, these values are 1.26 ± 0.127, 1.11-1.56,

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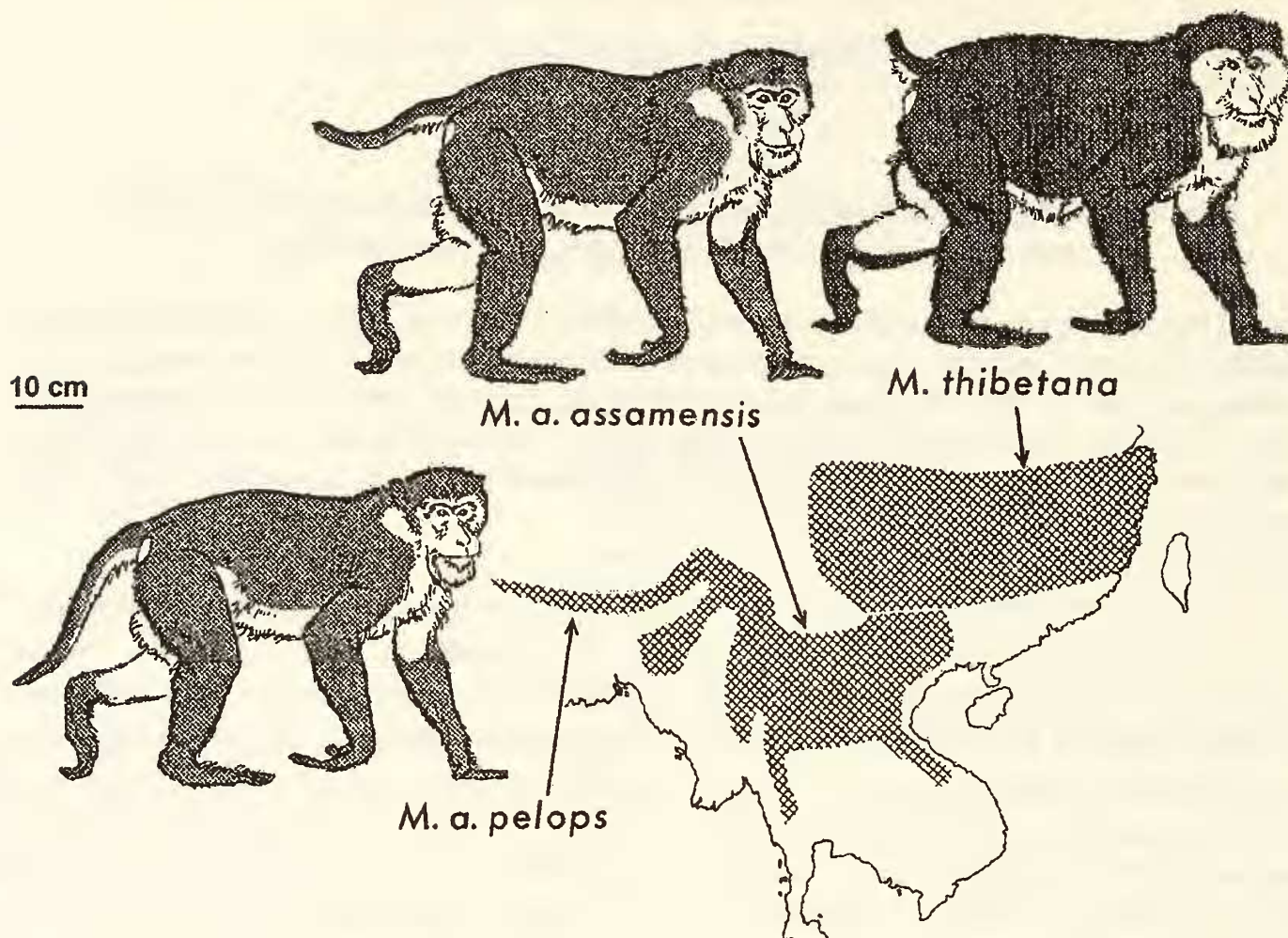


Fig.1: External characters in adult males and geographic distribution of *Macaca assamensis pelops*, *Macaca assamensis assamensis* and *Macaca thibetana*; slightly modified from Fooden (1988, p. 4; cf. Fooden *et al.*, 1994, p. 623)

$n = 21$; and in *M. thibetana* adult males, these values are 0.41 ± 0.077 , $0.33-0.54$, $n=7$. Within each of these three taxa, no consistent pattern of geographic variation in T/HF is evident (Fig. 3).

TAIL LENGTH IN NEWLY OBSERVED NORTHEAST INDIAN MACAQUES

Choudhury (1998, p. 7; 2000, pp. 6, 14) observed macaques with unexpected tail proportions in November 1997 at Piri La ($27^{\circ} 07' N$, $92^{\circ} 26' E$), western Arunachal Pradesh, Northeast India. At this locality, three troops of monkeys were encountered in temperate broadleaf forest at 2,000-2,700 m elevation; troop size, determined for two troops, was >15 and 21. In one of these troops, Choudhury was able to sketch the dominant adult male and to sketch and

photograph one of two subordinate adult males (Fig. 4). Although circumstances did not permit external measurements to be taken, Choudhury's sketches provide a basis for provisional estimation of T/HF in these two adult males; tail length is also clear in Choudhury's (1998, inside front cover) colour photograph of the subordinate adult male, but, unfortunately, the monkey's hind feet are obscured by foliage in this photograph, which therefore precludes its use for calculation of a second estimate of T/HF in this monkey. From the available (albeit suboptimal) evidence of Choudhury's sketches, T/HF in the dominant male is roughly estimated to be 1.2, and T/HF in the subordinate male is roughly estimated to be 0.8 (see Appendix).

Sightings of macaques said to have tail proportions similar to those of the Piri La

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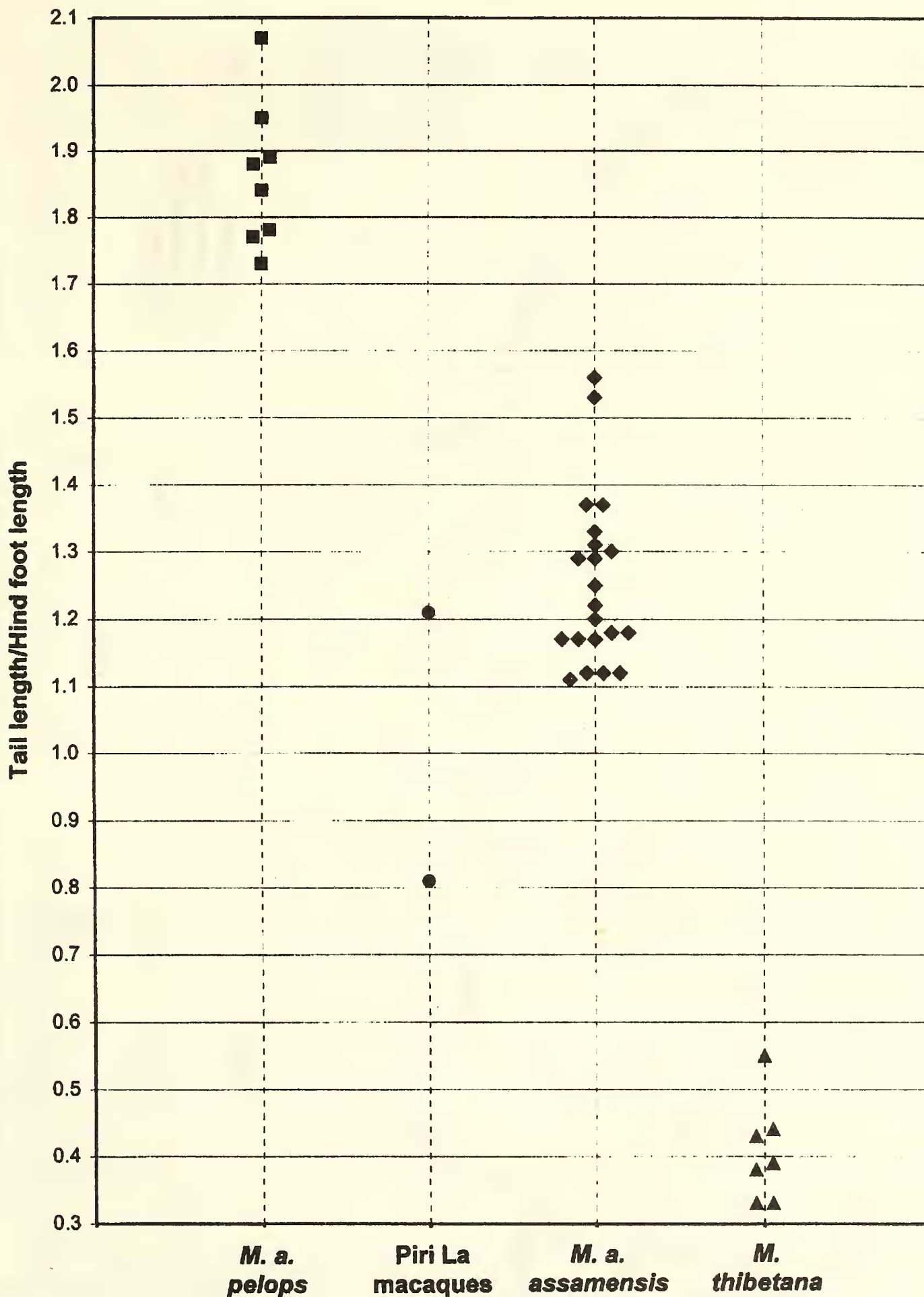


Fig. 2: Tail length/hind foot length ratios in adult male Piri La macaques compared with ratios in adult male *Macaca assamensis pelops*, *Macaca assamensis assamensis* and *Macaca thibetana*; for documentation see Appendix

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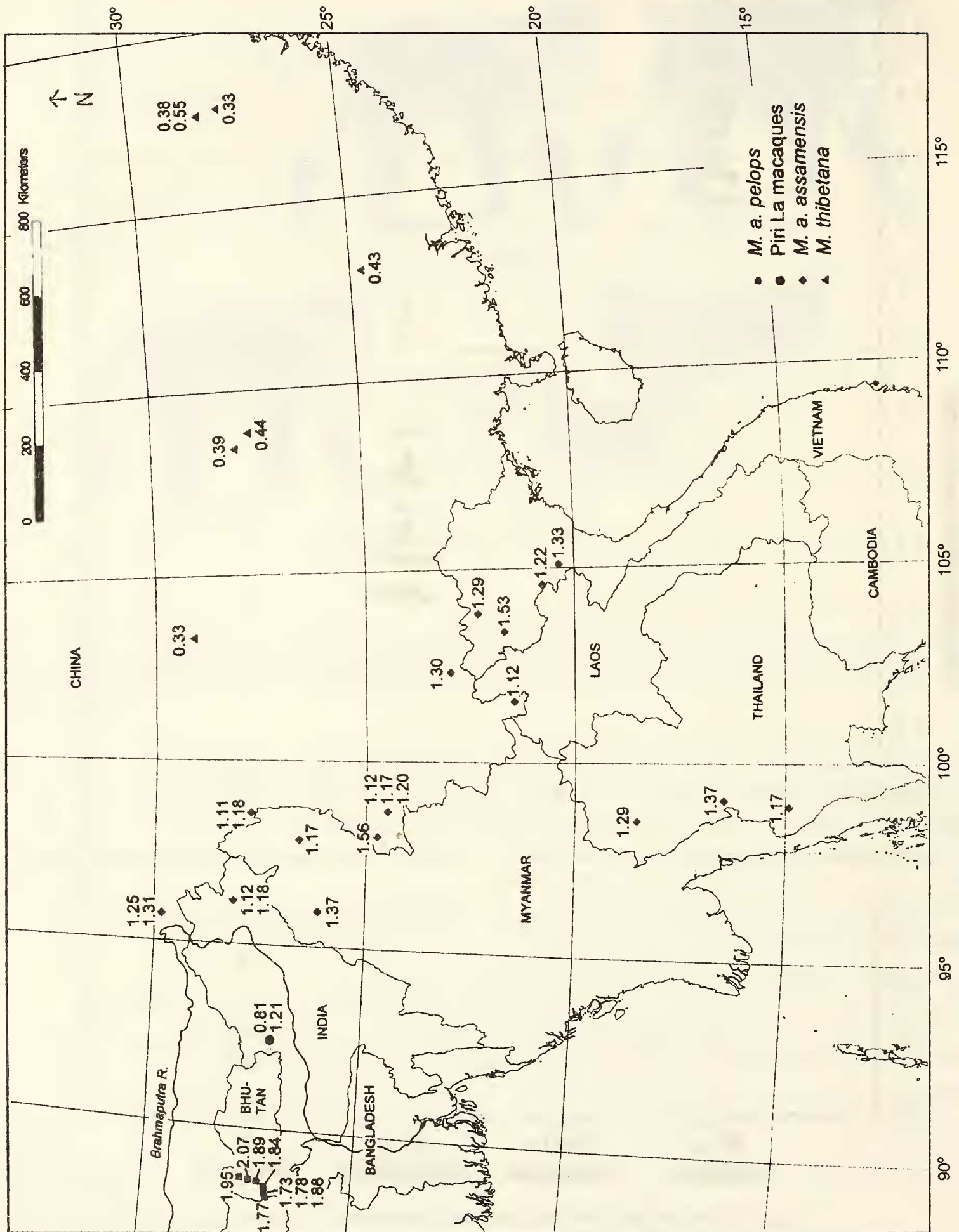


Fig. 3: Geographic variation in tail length/hind foot length ratio in adult male Piri La macaques, *Macaca assamensis assamensis* and *Macaca thibetana*; for documentation see Appendix

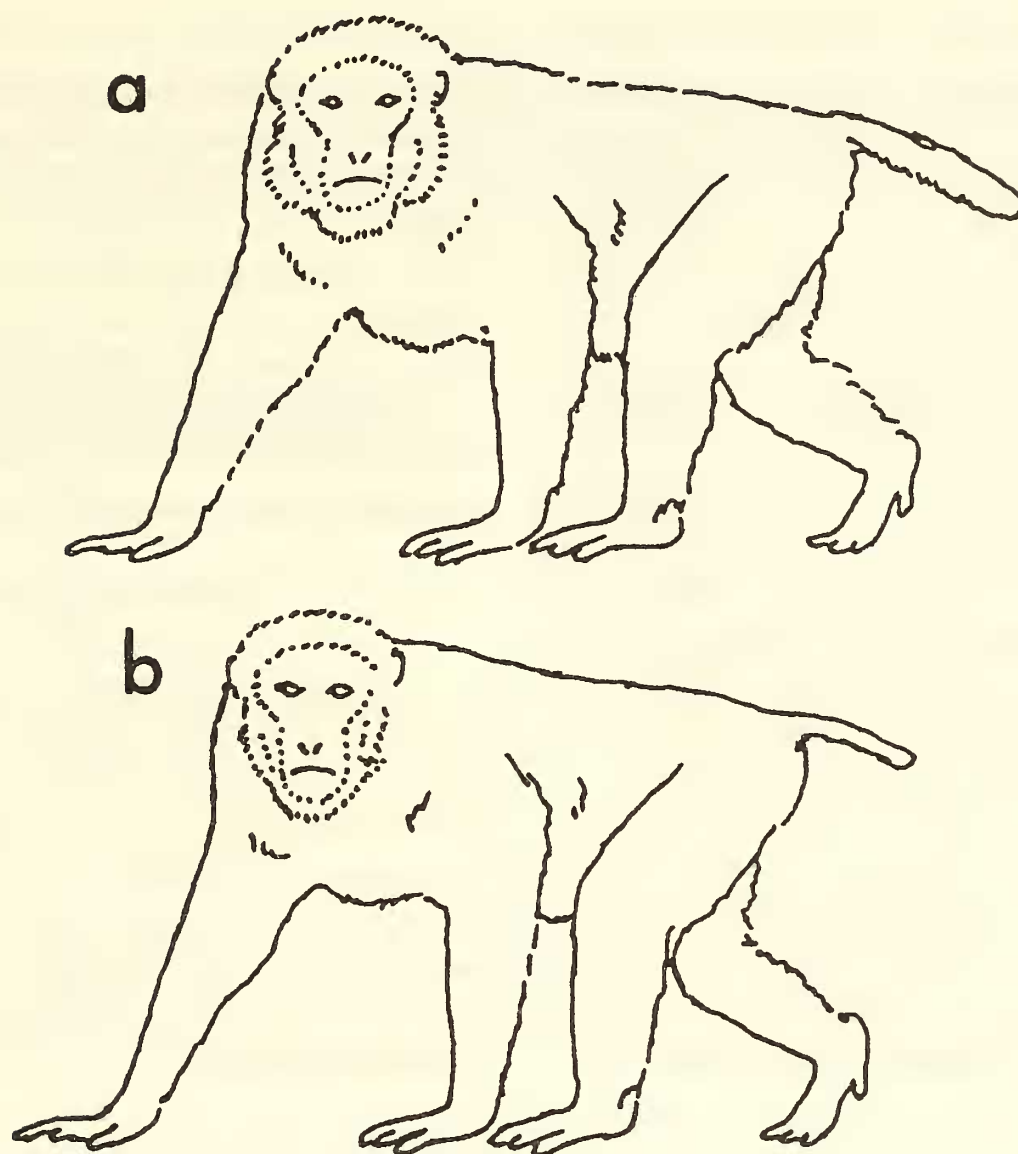


Fig. 4: Field sketches of Piri La macaques: (a) dominant adult male, (b) subordinate adult male; reproduced from Choudhury (2000, p. 13), by permission

macaques also have been reported by local inhabitants at three localities 20-60 km west and north of Piri La (Choudhury 2000, pp. 8, 15); no quantitative estimates of T/HF are available from these reports. All of these sightings of Piri La-like macaques apparently are at upper elevations, 2,000-3,100 m (Choudhury 2000, pp. 15, 20). At lower elevations, 100-2,000 m, longer-tailed *M.a. pelops* (T/HF \approx 1.85; Fig. 2) is reportedly common in this part of western Arunachal Pradesh (Choudhury 2000, pp. 15, 20).

Choudhury (2000, pp. 4, 6, 19) further suggests that the Piri La macaques may differ from *M. assamensis* in slightly darker dorsal pelage coloration, slightly more prominent side whiskers, and in an unspecified slightly different

vocalisation. Information provided concerning these subtle differences between Piri La macaques and *M. assamensis* is insufficient to permit evaluation of the postulated differences at this time; within *M. assamensis*, variation in dorsal pelage coloration and prominence of side whiskers has been reported previously (Fooden 1982, p. 6).

DISCUSSION

Judging from available information, T/HF in the Piri La adult males clearly differs from T/HF in *M.a. pelops* and *M. thibetana* adult males (Fig. 2) (cf. Choudhury 1998, p. 7; Groves 2001, p. 235). T/HF in the Piri La dominant adult male (*c.* 1.2) is near the mean value for T/HF in *M.a. assamensis*

(1.26); T/HF in the Piri La subordinate adult male (*c.* 0.8) is less than the minimum value known in *M.a. assamensis* (1.11). For the present, it seems reasonable to allocate the Piri La macaques to *M.a. assamensis*, as tentatively suggested by Choudhury (2000, p. 20). In this case, the low T/HF value of the Piri La subordinate male may be interpreted alternatively as an individual abnormality, as an expansion of the range of previously known normal variation of this character in *M.a. assamensis*, or as an artifact of the method of estimation. The uncertainty concerning T/HF in the subordinate male can be resolved, as indicated by Choudhury (2000, p. 20), by future quantitative study of T/HF at Piri La and other upper elevation localities from where Piri La-like macaques have been reported.

Assuming that the Piri La macaques are correctly allocated to the subspecies *M.a. assamensis*, the known geographic range of this subspecies is thereby extended *c.* 400 km westward along the Lesser Himalaya, west of the great bend of the Brahmaputra river (Fig. 3); a

previous designation of the Brahmaputra river as the intersubspecific boundary between the ranges of *M.a. pelops* and *M.a. assamensis* was an extrapolation based on locality records then available (Fooden 1982, pp. 32, 34). Choudhury's (2000, p. 20) new information indicates that the contact zone between *M.a. pelops* (100-2,000 m) and *M.a. assamensis* (2,000-3,100 m) is located at *c.* 2,000 m along the slopes of the Lesser Himalaya, west of the Brahmaputra river, in Arunachal Pradesh and possibly also in adjacent Bhutan.

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APPENDIX

Documentation of collectors' flesh measurements of tail length and hind foot length
in *Macaca assamensis* and *Macaca thibetana* adult males (cf. Figs. 2 and 3)

Coordinates	Locality, State/Province, Country	Elevation (m)	Museum ¹	Specimen no.	Tail length (mm)	Hind foot length (mm)	T/HF ratio
<i>Macaca assamensis pelops</i>							
27° 00' N, 88° 08' E	Batasia, West Bengal, India	900	BM(NH)	1937.3.24.8	283	160	1.77
27° 02' N, 88° 14' E	Sookia Pokhari, West Bengal, India	1,500	BM(NH)	1915.9.1.3	320	170	1.88
27° 02' N, 88° 14' E	Sookia Pokhari, West Bengal, India	1,500	BNHS	5121	300	173	1.73
27° 02' N, 88° 14' E	Sookia Pokhari, West Bengal, India	1,500	BNHS	5122	320	180	1.78
27° 03' N, 88° 25' E	Pashok, West Bengal, India	1,050	BM(NH)	1937.3.24.9	332	180	1.84
27° 14' N, 88° 33' E	Singtam, Sikkim, India	1,450	FMNH	35454	360	190	1.89
27° 25' N, 88° 35' E	Dikchu, Sikkim, India	600	FMNH	82809	345	167	2.07
27° 38' N, 88° 38' E	Chuntang, Sikkim, India	1,630	BM(NH)	1915.9.1.2	328	168	1.95
Piri La macaques²							
27° 07' N, 92° 26' E	Piri La, Arunachal Pradesh, India	2,000- 2,700	-	dominant male	-	-	1.21
27° 07' N, 92° 26' E	Piri La, Arunachal Pradesh India	2,000- 2,700	-	subordinate male	-	-	0.81
<i>Macaca assamensis assamensis</i>							
14° 55' N, 98° 55' E	Ban Muang Baw Ngam, Kanchanaburi, Thailand	1,100	FMNH	99622	197	169	1.17
16° 20' N, 99° 04' E	Ban Pong Nam Ron, 25 km W, Kamphaeng Phet, Thailand	750	FMNH	99631	235	172	1.37
18° 32' N, 98° 32' E	Inthanon, Doi Chiang Mai, Thailand	1,800	MCZ	37710	216	167	1.29
20° 22' N, 105° 06' E	Hoi Xuan, Thanh Hoa, Vietnam	-	BM(NH)	1932.4.19.1	230	173	1.33
20° 46' N, 104° 34' E	Chieng Ve, Son La, Vietnam	900	- ³	Coll. 408	225	185	1.22
21° 28' N, 101° 35' E	Mengla Xian, Yunnan, China	600-700	KIZ	161	205	183	1.12
21° 42' N, 103° 22' E	Muong Moun, Lai Chau, Vietnam	350	FMNH	31765	245	160	1.53
22° 20' N, 103° 51' E	Sa Pa (earlier Chapa), Lao Cai, Vietnam	1,500	FMNH	39163	215	167	1.29
23° 00' N, 102° 20' E	Dahongshan, Yunnan, China	700-800	KIZ	Coll. 72154	240	185	1.30
24° 30' N, 98° 40' E	Zhung Shan, Yunnan, China	1,500- 2,000	IZCAS	17942	204	170	1.20
24° 30' N, 98° 40' E	Zhung Shan, Yunnan, China	1,500- 2,000	IZCAS	17945	205	175	1.17
24° 30' N, 98° 40' E	Zhung Shan, Yunnan, China	1,500- 2,000	IZCAS	17957	190	170	1.12
24° 45' N, 98° 00' E	Yingjiang, Yunnan, China	-	IZCAS	26681	250	160	1.56
26° 08' N, 95° 57' E	Jantang-Dagung Hka, Sagaing Division, Myanmar	225	AMNH	112736	240	175	1.37
26° 36' N, 97° 52' E	Htingnan Triangle, Kachin State, Myanmar	1,050	BM(NH)	1950.385	216	184	1.17
27° 45' N, 98° 35' E	Shuanglawa, Yunnan, China	2,200	KIZ	Coll. 73429	200	180	1.11
27° 45' N, 98° 35' E	Shuanglawa, Yunnan, China	2,200	KIZ	Coll. 73430	195	165	1.18

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APPENDIX (contd)

Documentation of collectors' flesh measurements of tail length and hind foot length in *Macaca assamensis* and *Macaca thibetana* adult males (cf. Figs. 2 and 3)

Coordinates	Locality, State/Province, Country	Elevation (m)	Museum ¹	Specimen no.	Tail length (mm)	Hind foot length (mm)	T/HF ratio
28° 00' N, 96° 10' E	Tebang river, Arunachal Pradesh, India	600	BM(NH)	1937.3.24.10	190	170	1.12
28° 00' N, 96° 10' E	Tebang river, Arunachal Pradesh, India	600	BM(NH)	1937.3.24.11	200	170	1.18
29° 50' N, 95° 45' E	Bomi, Xizang, China	2,750	IZCAS	Coll. 0148	200	160	1.25
29° 50' N, 95° 45' E	Bomi, Xizang, China	2,750	IZCAS	Coll. 73064	230	175	1.31
<i>Macaca thibetana</i>							
24° 45' N, 113° 00' E	Pingxi, Guangdong, China	800	SCIEA	Coll. 2197	80	184	0.43
27° 42' N, 108° 50' E	Jiangkou, Guizhou, China	700	KIZ	03195	80	180	0.44
27° 51' N, 117° 49' E	Chong'an Xian, Fujian, China	-	AMNH	84472	55	168	0.33
28° 01' N, 108° 24' E	Yingjiang Xian, Guizhou, China	1,250-2,350	IZCAS	17967	75	190	0.39
28° 20' N, 117° 40' E	Qianshan Xian, Jiangxi, China	1,000-1,200	IZCAS	20000	90*	165*	0.55
28° 20' N, 117° 40' E	Qianshan Xian, Jiangxi, China	1,000-1,200	IZCAS	20002	60*	160*	0.38
29° 07' N, 103° 18' E	Hsiao Yang Chi, Sichuan, China	-	FMNH	38499	65	198	0.33

¹Key to abbreviations: AMNH = American Museum of Natural History, New York. BM(NH) = British Museum (Natural History), London. BNHS = Bombay Natural History Society, Mumbai. FMNH = Field Museum of Natural History, Chicago. IZCAS = Institute of Zoology, Chinese Academy of Sciences, Beijing. KIZ = Kunming Institute of Zoology, Kunming. MCZ = Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts. SCIEA = South China Institute of Endangered Animals, Guangzhou.

²Data from Choudhury (2000, pp. 13, 15); in Choudhury's drawings (p. 13), tail length and hind foot length of the dominant male are 17 mm and 14 mm, respectively, and tail length and hind foot length of the subordinate male are 11 mm and 13.5 mm, respectively.

³Data from Dao (1978, pp. 378, 382).

*Measurements taken on skeleton, recorded in collector's field notebook.

